THE AMANITAS OF EASTERN NORTH AMERICA

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(WITH PLATES 85 AND 86)

So much has been written on this important group of gill-fungi, both in Europe and America, that it is difficult to review in a brief paper the various opinions that have been held and the numerous discussions that have arisen regarding the identity, variability, distribution, and properties of the species it comprises. My present object is rather to list the chief eastern North American species, with a few of the names under which they have been known, and to add brief notes that students may appreciate. No reference is made here to the poisonous or edible properties of the individual species, as it is the opinion of the writer that the entire group should be strictly avoided by the mycophagist. After reading the following paper it may perhaps be more easily understood why this statement is made. Aside from the great variations in certain species, the accidental loss of a delicate structure like the veil may entirely remove a specimen from a dangerous genus and transfer it to one in which all the known species are harmless.

VENENARIUS Earle, Bull. N. Y. Bot. Gard. 5: 450. 1909

The type of *Amanita* is *Agaricus campestris,* hence this familiar generic name must be discarded.

Volva free, conspicuous, persistent; stipe not bulbous.
- Volva wide; lamellae yellow; pileus red, orange, or yellow. — 1. *V. Caesareus.*
- Volva narrow; lamellae white; pileus white or brown. — 2. *V. spretus.*

Volva adnate to the base of the bulbous stipe, limb free, usually persistent; pileus white or variously colored, smooth or with few patches. — 3. *V. phalloides.*

Volva ocreate, usually marginate; pileus covered with remnants of the volva.
- Pileus 3–7 cm. broad, white or tinged with yellow or olive. — 4. *V. cothurnatus.*

Pileus 8–10 cm. broad, umber-brown, sometimes tinged with yellow. 5. *V. velatipes.*

Volva fragile, adnate to the pileus and stipe as warts, patches, or scales; pileus rarely smooth from the first, often becoming smooth with age.

Flesh at length staining reddish when wounded; pileus usually dull-reddish. 6. *V. rubens.*

Flesh not staining reddish when wounded.

Pileus dark-brown, smooth from the first, margin not striate. 7. *V. Morrisii.*

Pileus orange to yellow, 8–20 cm. broad; stipe usually rough, with concentric, margined scales adnate to the bulbous base. 8. *V. muscarius.*

Pileus chrome-yellow to orange-yellow, 3–8 cm. broad; stipe slender, smooth, with remnants of the fragile, yellowish volva at the base. 9. *V. Fros ianus.*

Pileus flavous with a melleous tint to dark-brownish-melleous, 6–10 cm. broad; stipe tomentose to floccose-scaly, reddish below, especially when bruised; volva yellow, fragile. 10. *V. flavorubescens.*

Pileus pale-yellow, 4–5 cm. broad, tuberculate-striate on the margin; stipe smooth, glabrous; volva fragile, subappressed to the bulbous base. 11. *V. russuloides.*

Pileus whitish or grayish tinged with yellow, with peculiar white, webby patches; stipe floccose, mealy above; volva slight, evanescent. 12. *V. crenulatus.*

Pileus white to grayish or murinous, pulverulent, warty, or spiny; stipe bulbous or radicate; odor often strong, resembling chlorine. 13. *V. solitarius.*

1. **Venenarius Caesareus** (Scop.)

Agaricus Caesareus Scop. Fl. Carn. ed. 2, 2: 419. 1772.

Amanita Caesarea Pers. Syn. Fung. 252. 1801.

Amanita pellucida Banning & Peck, Ann. Rep. N. Y. State Mus. 44: 66. 1892. (Type from Maryland.)

Described from Europe, and found in woods from New England to Alabama and west to Ohio.

2. **Venenarius spretus** (Peck)

Agaricus (*Amanita*) *spretus* Peck, Ann. Rep. N. Y. State Mus. 32: 24. 1879.

Described from Sandlake, New York, and found in open or bushy places in the eastern United States from Maine to Alabama.

American specimens determined as *Amanita recutita* Fries doubtless belong in this category.

3. VENENARIUS PHALLOIDES (Fries) Murrill, Mycologia **4**: 240. 1912

Agaricus phalloides Fries, Syst. Myc. **1**: 13. 1821.

Amanita floccocephala Atk. Stud. Am. Fungi 62. 1900. (Type from Ithaca, New York.)

Amanita lignophila Atk. Ann. Myc. **7**: 366. 1909. (Type from Ithaca, New York.)

Amanita bisporigera Atk. Bot. Gaz. **41**: 348. *f. 1–17.* 1906. (Type from Ithaca, New York.)

Described from Europe, and found in America in woods from New Brunswick to Alabama and west to Iowa and California. It was known under several binomials before a part of Vaillant's polynomial was taken up by Fries, but the problem is to find the earliest correct one. Even if *Agaricus bulbosus* Bull. were identical with this species, it is preceded by *Agaricus bulbosus* Schaeff., which is described and figured as having an evanescent volval limb. *A. stramineus* Scop. and *A. citrinus* Schaeff. both seem to apply to *A. Mappa* Fries, which is more or less in doubt. *Amanita verna* Pers., next in line, is based partly on Lamarck's *A. verna,* which is considered the same as *A. virosa* Fries, and partly on *Agaricus bulbosus vernus* Bull., a later name which coincides with our conception of *Amanita verna.* It therefore seems best to adhere for the present to the name assigned by Fries.

The species represents a strong, prevailing type, which assumes various forms and colors in different regions of its wide distribution, and to endeavor to keep them distinct would only confuse students and give them a wrong conception of species.

4. **Venenarius cothurnatus** (Atk.)

Amanita cothurnata Atk. Stud. Am. Fungi 66. *f. 68–70.* 1900.

Described from North Carolina, and found on the ground in woods in the eastern United States from New York to Alabama and west to Pennsylvania and Tennessee. Beardslee considers this species only a white form of *Amanita pantherina.*

VENENARIUS MUSCARIUS (L.) Earle

5. **Venenarius velatipes** (Atk.)

Amanita velatipes Atk. Stud. Am. Fungi 63. *f. 64–67.* 1900.

Known only from specimens collected in beech woods near Ithaca, New York. It resembles *A. pantherina,* but is larger.

6. **Venenarius rubens** (Scop.)

Agaricus rubens Scop. Fl. Carn. ed. 2, **2**: 416. 1772.
Agaricus pustulatus Schaeff. Fung. Bav. **4**: 39. *pl. 91.* 1774.
Agaricus myodes Schaeff. Fung. Bav. **4**: 69. *pl. 261.* 1774.
Agaricus verrucosus Bull. Herb. Fr. *pl. 316.* 1786.
Amanita rubescens Pers. Syn. Fung. 254. 1801.
Amanita aspera Pers. Syn. Fung. 256. 1801.
Agaricus rubescens Fries, Syst. Myc. **1**: 18. 1821. Not *Agaricus rubescens* Schaeff. 1774.
Agaricus asper Fries, Syst. Myc. **1**: 18. 1821.
Agaricus magnificus Fries, Epicr. Myc. 10. 1838.

Described from Europe, and found in woods and groves from Maine to Alabama and west to Ohio. This species is said to have a white variety farther south, which was known to Schweinitz.

7. **Venenarius Morrisii** (Peck)

Amanita Morrisii Peck, Bull. N. Y. State Mus. **139**: 42. 1910.

Described from Massachusetts, and occurring among mosses in swampy places in certain parts of that state.

8. VENENARIUS MUSCARIUS (L.) Earle, Bull. N. Y. Bot. Gard. **5**: 450. 1909

Amanita muscaria Pers. Syn. Fung. 253. 1801.

Described from Europe, and occurring throughout temperate regions in woods and thickets. A pale form found on Long Island is considered by Peck to be closely related to white forms of *A. pantherina,* but to differ in volval characters. I have found small, pale forms under conifers in this vicinity, also a beautiful lemon-yellow form similar in every way to our usual northern orange form except in color. These color variations, together with the tendency of the stipe to be ocreate at times, may be quite confusing. The flesh of this species is said to be bitter, but I have not found it so, either in the fresh or dried state.

9. **Venenarius Frostianus** (Peck)

Agaricus muscarius minor Peck, Ann. Rep. N. Y. State Cab. **23**: 69. 1872.

Agaricus Frostianus Peck, Ann. Rep. N. Y. State Mus. **33**: 44. 1880.

Amanita flavoconia Atk. Jour. Myc. **8**: 110. 1902. (Type from Freeville, New York.)

Described from New York, and found in woods from New Brunswick to Alabama and west to Wisconsin. Among the large number of specimens I have collected, very few are at all marginate or ocreate; in most of them the volva is friable and breaks up rather early. In Peck's first study of the species, he had one of these exceptional plants with a marginate bulb and laid more stress on this character in his description than later collections justified. The species is usually small, but I have found it at Lake Placid with the cap 7 cm. broad and the stem 13 cm. long. It often shows a fondness for decayed wood as a substratum. In collecting one summer at Mountain Lake, Virginia, nearly every specimen seen was growing in the remains of old logs, after the manner of *Russula emetica.*

10. **Venenarius flavorubescens** (Atk.)

Amanita flavorubescens Atk. Jour. Myc. **8**: 111. 1902.

Described from Ithaca, New York, and reported also from Connecticut and Pennsylvania. This species appears commonly from June to September about New York City, under oaks on lawns or in thin woods, and I have had opportunities to study it closely. Its various forms have suggested *V. muscarius, V. rubens,* and *V. russuloides.* The color of the cap varies from flavous with a melleous tint to dark-brownish-melleous, and both the partial and the universal veil are flavous. The remains of the volva have usually mostly disappeared at maturity, but at times they are quite persistent. The base of the stipe is often somewhat enlarged, but is never rounded into a bulb. The characteristic tomentum on the stipe is rarely absent and may usually be relied upon in determining dried specimens.

11. **Venenarius russuloides** (Peck)

Agaricus (*Amanita*) *russuloides* Peck, Bull. Buffalo Soc. Nat. Sci. **1**: 41. 1873.

Described from Greenbush, New York, and found in grassy ground in open woods or groves in New York and Massachusetts. According to Beardslee, it is not distinct from *Amanita junquillea* Quél., which, according to Boudier, is the same as *A. vernalis* Gill. and *A. Amici* Gill. The descriptions of *V. russuloides* and *A. junquillea* appear to be identical, except for the "tuberculate margin" of the former. Boudier's figures come nearer to representing our plant than do those of Quélet.

12. **Venenarius crenulatus** (Peck)

Amanita crenulata Peck, Bull. Torrey Club **27**: 15. 1900.

Described from eastern Massachusetts, and known to occur in low shaded places in that part of the state. It resembles *V. russuloides* and *V. cothurnatus* in many ways, but the surface has a peculiar flocculent or webby covering similar to that of *V. muscarius,* and the base of the stipe is not ocreate.

13. VENENARIUS SOLITARIUS (Bull.) Murrill, Mycologia **4**: 240. 1912

Agaricus solitarius Bull. Herb. Fr. *pl. 48.* 1780.

Agaricus solitarius Fries, Syst. Myc. **1**: 17. 1821.

Agaricus strobiliformis Vitt. Fung. Mang. 59. 1835. (Type from Italy.)

Agaricus echinocephalus Vitt. Fung. Mang. 346. 1835. (Type from Italy.)

Agaricus polypyramis B. & C. Ann. Nat. Hist. II. **12**: 417. 1853. (Type from South Carolina.)

Agaricus monticulosus B. & C. Ann. Nat. Hist. II. **12**: 418. 1853. (Type from South Carolina.)

Agaricus Ravenelii B. & C. Ann. Nat. Hist. III. **4**: 284. 1859. (Type from South Carolina.)

Agaricus muscarius major Peck, Ann. Rep. N. Y. State Cab. **23**: 69. 1872.

Agaricus (*Amanita*) *onustus* Howe, Bull. Torrey Club **5**: 42. 1874. (Type from New York.)

Agaricus (*Amanita*) *chlorinosmus* Peck in Austin, Bull. Torrey Club **6**: 278. 1878. (Type from Closter, New York.)

Amanita candida Peck, Bull. Torrey Club **24**: 137. 1897. (Type from Alabama.)

Amanita prairiicola Peck, Bull. Torrey Club **24**: 138. 1897. (Type from Kansas.)

Amanita multisquamosa Peck, Ann. Rep. N. Y. State Mus. **53**: 840. 1900. (Type from New York.)

Amanita radicata Peck, Bull. Torrey Club **27**: 609. 1900. (Type from New Jersey.)

Amanita cinereoconia Atk. Ann. Myc. **7**: 366. 1909. (Type from Chapel Hill, North Carolina.)

Described from Europe, and known in the United States from New York to Alabama and west to California, growing either in open ground or in thin woods. The species is very variable and has been much discussed under a variety of names, some of them older than the ones here listed. A number of other synonyms might be added.

The variations appear in several characters and are conspicuous. The color is usually white, but varies to yellowish, cinereous, gray, or murinous. The surface may be pulverulent, or adorned with flat, gemmate, or spiny scales, which sometimes persist and at other times disappear and leave the surface glabrous. The veil usually tears into shreds, but may persist as an ample annulus. The volva is usually fragile like the veil, but cup-shaped or ocreate forms occur. The base of the stipe may be bulbous, or enlarged and radicate, or slender and radicate. The spores are ellipsoid, but vary much in size, some measurements being as low as 7–10 $\times$ 5–7 μ and others reaching 12–14 $\times$ 7–9 μ. Even the peculiar odor noted in some specimens and described as resembling that of chlorine, chloride of lime, or nitric acid, is definitely stated by responsible collectors to be entirely absent in many cases.

We have represented in this species one of those widely distributed and prevailing types in which variation has run riot, to the confusion of the student and the amazement of the specialist. It would be well if some advanced student or investigator could devote his attention to the morphology of these various forms, studying them as a group, and endeavor to determine the lines

and limits of variation, as well as some of the causes that have operated to produce the forms as we now know them.

DOUBTFUL SPECIES

This list includes species that have not been sufficiently studied by the writer, or species imperfectly known by mycologists generally.

Amanita abrupta Peck, Bull. Torrey Club **24**: 138. 1897. Known only from specimens collected by Underwood and Baker in woods near Auburn, Alabama. It is near *Venenarius solitarius,* but the slender stipe terminated below by a large subglobose bulb distinguishes it from the forms of that species with which I am familiar. It is very desirable that fresh specimens be obtained and color sketches or photographs be made from them for comparison with *V. solitarius* and *V. cothurnatus.*

Amanita elliptosperma Atk. Ann. Myc. **7**: 336. 1909. Described from Chapel Hill, North Carolina. Resembling white forms of *Venenarius phalloides,* but said to have ellipsoid spores. The dried specimens are similar to those of *Amanita verna.*

Amanita elongata Peck, Bull. N. Y. State Mus. **131**: 33. 1909. Described from specimens collected by Sterling in Pennsylvania, July, 1907, on damp grassy ground in the borders of woods. Resembling *Vaginata albocreata,* but having a well-developed annulus. From yellow forms of *Venenarius phalloides,* it differs in its very long, slender stipe and the absence of a free limb to the volva. In color and general appearance, except the long stipe, it greatly resembles *Venenarius Frostianus.* Further field studies are highly desirable.

Amanita flavorubens B. & Mont. Syll. Crypt. 96. 1856. Described from Columbus, Ohio, and reported also from West Virginia. Very near *Venenarius rubens.*

Amanita glabriceps Peck, Bull. N. Y. State Mus. **131**: 18. *pl. U.* 1909. Described from Coopers Plains, New York, and known also from one other locality in the state. Pileus white or yellowish-white, often striate on the margin; stipe long, glabrous or floccose-squamulose, bulbous; volva circumscissile, slightly marginate; spores globose, 8 μ. Dr. Peck states that this species is closely related to *Venenarius phalloides.*

Amanita magnivelaris Peck, Ann. Rep. N. Y. State Mus. **50**: 96. 1897. Described from Port Jefferson, New York, and said by the author to differ from *Amanita verna* in its large, persistent annulus; its elongate, downwardly tapering bulb; and especially in its ellipsoid spores.

Amanita submaculata Peck, Bull. Torrey Club **27**: 609. 1900. Known only from a single specimen, accompanied by a sketch, sent to Dr. Peck from North Carolina by Miss Wilson, who, pronouncing it edible, must have collected more than one sporophore. If it had not been pronounced edible, I should be inclined to classify it as a dark-centered form of *Venenarius phalloides,* in which most of the volva had been carried up on the surface of the cap. The type is sterile, and further field study of the plant is highly desirable.

European Species Reported in America

A number of names are current in America that evidently apply only to European species. Some of these may turn out to be European varieties of species common to both countries.

Agaricus excelsus Fries, Syst. Myc. **1**: 17. 1821

This is not distinct from *Amanita ampla* Pers., according to Boudier.

Venenarius junquilleus (Quél.)

Amanita junquillea Quél. Bull. Soc. Bot. Fr. **23**: 324. *pl. 3. f. 10.* 1876.

It is the opinion of some mycologists that this is not distinct from *Venenarius russuloides.*

Agaricus nitidus Fries, Obs. Myc. **1**: 4. 1815

A mixture of *Amanita citrina alba* Pers. and *Agaricus strobiliformis* Vitt., according to Boudier.

Venenarius pantherinus (DC.)

Agaricus maculatus Schaeff. Fung. Bav. **4**: 39. *pl. 90.* 1774. Not *Agaricus maculatus* Scop. 1772.

Agaricus pantherinus DC. Fl. Fr. **6**: 52. 1815.

Described from France, and found in woods and groves throughout Europe and parts of Asia. I have been unable to find any typical specimens from this country. In the case of *V. phalloides,* we have white and dark forms abundantly represented, and it would seem natural to expect the dark forms of *V. pantherinus* also if the species occurs here. Beardslee has studied *V. cothurnatus* in North Carolina and *V. pantherinus* in Sweden, and he believes the two to be identical. He found the spores of both species to be globose in fresh specimens, changing to ellipsoid after the dried plants were kept for several weeks. *Amanita umbrina* Pers. Syn. Fung. 254. 1801 refers to the usual dark European form of this species. DeCandolle evidently did not use Persoon's name in *Agaricus* because it was preoccupied in that genus.

Venenarius porphyrius (Fries)

Agaricus porphyrius Fries, Syst. Myc. 1: 14. 1821.

Described from Europe, and reported by Beardslee from North Carolina. It is near *V. phalloides,* but the annulus becomes sooty-black with age or on drying.

Venenarius recutitus (Fries)

Agaricus recutitus Fries, Epicr. Myc. 6. 1838.

Specimens of *Venenarius spretus* have been referred to this species in America.

Venenarius spissus (Fries)

Agaricus spissus Fries, Epicr. Myc. 9. 1838.

AGARICUS VIROSUS Fries, Epicr. Myc. 6. 1838

This species has often been confused with white forms of *Venenarius phalloides,* from which it is said to differ in its strong odor and rough stipe.

VAGINATA (Nees) S. F. Gray, Nat. Arr. Brit. Pl. 1: 601. 1821

Amanitopsis Roze, Bull. Soc. Bot. Fr. 23: 50. 1876.

This genus is distinguished from *Venenarius* by the absence of

a veil. Because of the usually prominent sheath or volva in species of both genera, it was formerly customary to regard them as belonging to the same genus, and to speak of them all as "Amanitas."

Volva membranous, free; stipe not bulbous.
  Volva narrow, closely sheathing the stipe.
    Volva elongate, persistent; lamellae white; pileus variously colored. 1. *V. plumbea*
    Volva short, rather friable; lamellae lemon-yellow; pileus orange-red. 2. *V. parcivolvata.*
  Volva wide, not sheathing; pileus dull-white to yellowish, rarely reddish-brown, usually floccose or scaly. 3. *V. agglutina'a.*
Volva membranous, adnate to the base of the bulbous stipe, limb free.
  Stipe less than 3 cm. long; pileus pale-brown. 4. *V. pusilla.*
  Stipe much longer; pileus white or yellowish. 5. *V. albocreata.*
Volva fragile, adnate to the pileus and stipe in the form of squamules or patches.
  Pileus mealy or densely floccose; less than 5 cm. broad. 6. *V. farinosa.*
  Pileus decorated with few or many patches; usually more than 5 cm. broad. *V. plumbea strangulata.*

1. **Vaginata plumbea** (Schaeff.)

Agaricus plumbeus Schaeff. Fung. Bav. **4**: 37. *pl. 85, 86.* 1774.
Agaricus fulvus Schaeff. Fung. Bav. **4**: 41. *pl. 95.* 1774.
Agaricus hyalinus Schaeff. Fung. Bav. **4**: 63. *pl. 244.* 1774.
Agaricus badius Schaeff. Fung. Bav. **4**: 63. *pl. 245.* 1774.
Agaricus vaginatus Bull. Herb. Fr. *pl. 98.* 1782.
Amanita livida Pers. Syn. Fung. 247. 1801.
Amanita spadicea Pers. Syn. Fung. 248. 1801.
Vaginata livida S. F. Gray, Nat. Arr. Brit. Pl. **1**: 601. 1821.
Amanitopsis vaginata P. Karst. Hattsv. **1**: 6. 1879.
Vaginata vaginata Murrill, Mycologia **3**: 80. 1911.

Described from Bavaria, and occurring very commonly in woods and groves from Greenland to Alabama and west to Oregon and California; also sparingly in the northern Bahamas and the mountains of Jamaica. A number of names have been assigned to the various forms and colors of the plant by European mycologists. That assigned by Schaeffer to the common gray variety appears to be the earliest.

VAGINATA AGGLUTINATA (Berk. & Curt.) O. Kuntze

2. **Vaginata parcivolvata** (Peck)

Amanitopsis parcivolvata Peck, Bull. Torrey Club **27**: 610. 1900.
Amanita muscaria coccinea Beardslee, Jour. Elisha Mitchell Soc. **1**: 8. 1902.

This beautiful species, known to occur in thin woods from New Jersey to North Carolina, has a brilliant orange-red cap, lemon-yellow gills, and a lemon-yellow, pulverulent stem terminated by a short, friable volva. The writer found it under oaks at Blacksburg, Virginia, July, 1910, and compared it carefully with the white, yellow, gray, and blackish forms of *V. plumbea* common in that region. I have not examined Beardslee's specimens, but do not see how they can be distinct.

3. VAGINATA AGGLUTINATA (Berk. & Curt) O. Kuntze, Rev. Gen. **3**: 539. 1893

Agaricus agglutinatus Berk. & Curt. Hook. Jour. Bot. **1**: 97. 1849. (Type from South Carolina.)
Agaricus volvatus Peck, Ann. Rep. N. Y. State Mus. **24**: 59. 1872. (Type from Greenbush, New York.)
Agaricus soleatus Howe, Bull. Torrey Club **5**: 42. 1874. (Type from Yonkers, New York.)
Amanitopsis agglutinata Sacc. Syll. Fung. **5**: 23. 1887.
Amanitopsis volvata Sacc. Syll. Fung. **5**: 23. 1887.

Apparently rare in the warmer parts of temperate Europe and common in the eastern United States, occurring in open woods and wood borders from New England to Alabama and west to Ohio. It varies very much in size, and its surface may be entirely glabrous, or adorned with a few large patches from the volva, or covered with powder much as in *V. farinosa*. The usual color is dull-white or yellowish, but forms with the surface reddish-brown at the center or entirely reddish-brown are found at times. According to Bresadola, *A——— Barlae* Quél. refers to this species, and some think it should be known as *Amanitopsis baccata* (Fries) Sacc.

4. **Vaginata pusilla** (Peck)

Amanitopsis pusilla Peck, Ann. Rep. N. Y. State Mus. **50**: 96. 1898.

Known only from three small sporophores collected by Mrs. Anthony in grassy ground at Gouverneur, New York, in September. The cap is pale-brown when fresh and the gills become brownish. The dried specimens are now not easy to compare, but I cannot definitely connect them with any other known species.

5. **Vaginata albocreata** (Atk.)

Agaricus nivalis Peck, Ann. Rep. N. Y. State Mus. **33**: 48. 1883.
Not *Agaricus nivalis* Grev. 1823.
Amanitopsis albocreata Atk. Jour. Myc. **8**: 111. 1902.

This species is represented by a number of specimens in the Cornell University Herbarium, and at Albany the peculiar volval differences between it and *V. plumbea alba* are well shown. It is reported from New York to Alabama.

6. VAGINATA FARINOSA (Schw.) Murrill, Mycologia **4**: 3. *pl. 56. f. 5.* 1912

Amanita farinosa Schw. Schr. Nat. Ges. Leipzig **1**: 79. 1822.
Amanitopsis farinosa Atk. Stud. Am. Fungi 76. 1900.

Described from North Carolina, and found in open deciduous woods from New York to Alabama.

DOUBTFUL AND EUROPEAN SPECIES

Amanitopsis adnata (W. G. Sm.) Sacc. Syll. Fung. **5**: 24. 1887. Described from England, and reported from this country by Morgan, Harkness, and others. I have seen no American specimens that could be so referred.

Agaricus baccatus Fries, Epicr. Myc. 12. 1838. Founded on Micheli's plate 80, figure 4, accompanied by a brief description. The warts on the pileus are too evenly distributed, and the volva is too small and circumscissile to suggest our *Vaginata agglutinata*. If an annulus were present, the figure might suggest white forms of *Venenarius pantherinus*.

Agaricus daucipes B. & Mont. Syll. Crypt. 96. 1856. Described from Sullivant's collections at Columbus, Ohio, and placed by Saccardo in *Amanitopsis* although the description expressly

mentions the presence of a veil. Other parts of the description, such as the "radicate stipe" and the "warty pileus" make it pretty clear that the plant is only a form of *Venenarius solitarius.*

Amanitopsis hyperborea P. Karst. Hattsv. **1**: 7. 1879. Reported from Greenland by Rostrup (Med. Groenl. **3**: 528. 1888), but I have not seen it among American collections.

Agaricus praetorius Fries, Epicr. Myc. 11. 1838. Specimens of *Venenarius Caesareus* from America have been referred to this species.

Amanitopsis pubescens Sacc. Syll. Fung. **5**: 25. 1887. *Amanita pubescens* Schw. Schr. Nat. Ges. Leipzig **1**: 79. 1822. Described from specimens collected in grassy places in North Carolina. Schweinitz said it was rare, and Morgan, Beardslee, and others say that it has not been collected since his time. The description might suggest *Vaginata farinosa* or *Vaginata agglutinata,* but Schweinitz certainly knew the former and the volva of the latter could not be characterized as "vanishing." Some forms of *Venenarius solitarius* might be thought of, but none of them are quite small enough.

Amanitopsis pulverulenta Peck, Bull. N. Y. State Mus. **116**: 17. 1907. Described from plants collected by Peck on shaded roadside banks at Port Jefferson, New York, August, 1906. There are two boxes of specimens at Albany. One contains a single specimen having a long, pulverulent stipe, with bulbous base and no volva, and the pileus covered, except at the center, with a fine powder as in *Lepiota cretacea.* The other box contains several specimens, evidently the types, with short, often radicate, stems and caps that are sometimes gemmate. These latter plants are certainly *Venenarius solitarius,* and there is little doubt that the species belongs in that category.

Amanitopsis strangulata (Fries) P. Karst. Hattsv. **1**: 7. 1879. *Agaricus strangulatus* Fries, Epicr. Myc. 6. 1838. Much has been written about this species. Beardslee has recently studied it in Sweden and considers it distinct from *Vaginata plumbea,* being more robust and with an entirely different kind of volva. Boudier is of the same opinion. Fries's description in the *Epicrisis* and Battarra's plate call for an annulus, while Fries's later description and figure refer to the plant as we now know it. If

the plant is distinct, it must have another name, selected from such synonyms as *Agaricus Ceciliae* B. & Br., or *Agaricus inauratus* Secr. In America, it is reported from New England to Alabama and west to Wisconsin. Variations occur all the way from the entire sheath of *V. plumbea* to the extreme form in which the volva is broken into small particles and distributed on the surface of the cap. I will admit that this extremely friable form of the volva is puzzling, but, after all, it is difficult to separate it specifically from the livid form of *V. plumbea.* Lucand has figured a specimen of *V. plumbea* in his group of *A. strangulata.* Did he get the plants mixed, or is this another indication that they are not distinct species?

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